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DISCUSSION

SEWAGE POLLUTION OF BOUNDARY WATERS

BY MR. ALLAN J. MCLAUGHLIN

Printed in JOURNAL OF THE AMERICAN WATER WORKS ASSOCIATION, Vol. 1, No. 1, March, 1914, at pp. 24, etc., and presented for discussion at the Philadelphia Convention, May, 1914.

MR. J. M. DIVEN: In the last paragraph of Mr. McLaughlin's paper, he says:

> The greatest obstacle to proper operation and control of plants has been the difficulty of securing the right man to place in charge of the plant. The best type of man for this position is a graduate in sanitary engineering. He will not only be conversant with the mechanical details of the plant, but will be able to adjust his chemicals according to the constituents and needs of the raw water. Most important of all, he will be able to make daily bacteriological examinations to determine the efficiency of purification.

That would be all very well if all plants could afford graduates, and if there were enough of the graduates. This is rather a suggestion to the colleges and educational institutions that they might prepare men for this special work with some special course, although this need not necessarily be a four years' college course. The speaker believes that a man could be prepared to do all the necessary work in a very satisfactory manner in a one or two year course, and such a man could be employed at a much lower salary than a full college graduate expects. Such a man could be prepared for this particular kind of work as his specialty. The trouble is that the young college graduate really does not receive a good salary when he first goes out into the world of work, and then about the time that he has acquired some practical experience and is of some value to the plant employing him, he desires a much higher salary, and does not remain with his original employer; he has higher ambitions and the education to accomplish them, but if young men prepared in the way indicated could be employed at from $75 to $150 per month, they would be valuable, and would be satisfied with positions as managers of filtration plants of moderate size. They would remain for long terms in their positions, so the plants would not be subject to the annoyance of frequent new men in charge, each with his own ideas and hobbies. This, of course, supposes that the man can change his politics frequently enough to hold his job.

MR. EDWARD BARTOW: The young men should make themselves so indispensable that they will be retained by one administration after another, and then there will be no necessity for their changing their politics. The administration and control of water purification plants should be kept out of politics, as Mayor Blankenburg said this morning, and if such a public policy were adopted, it would permit of trained men continuing in service.

MR. W. H. RANDALL: If the young men will come to Canada, they will find that the trained men do not change with changes in administration; they keep their jobs just the same.

MR. F. A. DALLYN: It appears to the speaker that Mr. J. M. Diven rather belittled the significance of Dr. McLaughlin's remark re bacteriologic control that he quoted. It is all very well for Mr. Diven to talk about getting student graduates for $75 or $100 a month, but the fact cannot be overlooked that by employing experienced men of known efficiency a large plant may frequently be saved $10,000 or $15,000 a year for operating and maintenance expenses. When this is taken into consideration it seems absurd to talk about employing boys to do work for which experts are needed. The speaker was convinced that graduates just released from engineering courses are not at all capable of doing such specialized supervision, except under the instruction of one who is much more experienced; but these graduates frequently become very good men after a few years' experience, and if, after training, these men can take care of responsible positions, employers should either give them such positions or else wish them Godspeed in going ahead with the good work in other centers. The employer's organization has grown complete in the meantime and it is a simple matter to fill in with new assistants.

MR. J. M. DIVEN: Answering the last speaker will say that there was no intention of belittling the remarks of Mr. McLaughlin or taking issue with his views. But there are many small filter plants that cannot afford to have constant supervision by a technically trained man; and for these plants the training of men who are willing to work for moderate salaries would be a benefit. Such plants, should, however, be under the occasional direction of trained men, men to check up the everyday work of the operator, to also give him instruction and expert supervision. But the operator should have sufficient knowledge and experience to make the daily analyses of the water with sufficient accuracy to check up the work of the filters and to know when it was time to call in the expert.

The young college or technical school graduate seldom gets for a start more than $75 to $150; but he will not be long satisfied with a position that pays no more, and will move on to higher things, leaving the filter plant again in the hands and at the tender mercies of a new man, with new ideas and hobbies; one full of technical training, but no practical knowledge. Moreover, as a rule, the young man with technical training wants to get in a large plant where there is greater opportunity to learn, and where he will be working with men of experience who can teach him how to operate a filter plant such as he has ambition to be in charge of some day.

No doubt the technically trained man could effect great saving in the operation of a large plant, but in a plant with a total operating cost of not over $5000 per year, and there are many such, and soon will be many more, he could hardly save $10,000 or more per annum. But the methods which will effect such saving should be introduced into the plant by the consulting expert, who makes occasional visits to the plant and is supposed to instruct the operator in the best methods for handling the particular plant under his supervision.

The speaker was making a plea for intelligent filter operators; men with sufficient knowledge of filtration and water analysis to properly operate a small filter plant, and not soon get to look upon themselves as experts and possible designers of water purification plants; men just for the everyday running of the plant.

MR. F. A. DALLYN: The speaker agrees that it is not feasible to carry men of high technical skill in small plants, because of the excessive cost. He also agrees with Dr. Bartow as to the method to employ in small plants, using of university graduates with experienced supervision and hoped that this method would be fully enlarged on in Dr. Bartow's paper.

Mr. Frank C. Kimball: The speaker regrets that he did not hear all of the preceding discussion, but believes that the proper way of handling the matter is, as one of the speakers suggested, to consolidate expert supervision for a given number of plants. A central control could employ one, two or three assistants, as the case might be, at a lesser price than would have to be paid to obtain the same results otherwise. The speaker knows of such a method being very successfully carried out in a number of plants with which he has had personal connection. A consultant was employed, who could be called on whenever necessary to advise on matters affecting operation of purification works and other technical matters. In one case a young man just out of college who was employed at $60 a month, stayed with the plant, and his salary was gradually increased until he became sufficiently expert to go into consultant work himself, but while he was in his original employment, under a salary of from $60 to $100 a month, under the advice of the consultant, he certainly saved the company several times what the arrangement cost them; but such an arrangement, of course, would not be possible in the character of plant referred to by Mr. Diven, where the operating expenses were only $4000, $5000 or $6000 a year. The arrangement to which the speaker referred was in connection with a plant where the operating expenses ran from $40,000 to $50,000 a year, and still it is not what would be considered a large plant. There is no question but that where purification methods are necessary, which, under present day practice, is probably the case in 90 per cent or more of the plants, some supervision is necessary; and while it may be hard to convince the powers that be of that necessity, after they are once convinced they will never go back to the old plan. Of course, the expenses must be kept within reasonable limits at all times.

Mr. Francis Ward Langstroth: In Rahway we have a laboratory at our works that cost about $1000. Our engineer was given careful instruction how to make bacteriological tests, he is furnished with the media and everything necessary for making the tests; as he does the work daily, he has become quite expert. He sends a daily report to our chemist in New York City to be checked there. Once each week a sample of the water is sent to New York to be tested and result compared with the report sent from the pumping station. At least once every two months the chemist from New

York visits the plant unannounced. We also have frequent visits from the State Board of Health. Our work being under supervision of an expert engineer in New York City, we have no trouble in carrying on our work in this way.

MR. C. FALLER: The town of Carlisle employs a chemist from Dickinson College. He charges $20 for every analysis he makes.

PROF. J. M. CAIRD: Without desiring to talk shop, perhaps the speaker may be permitted to describe a system with which he is familiar, that is in use in a large number of places. In some instances, as in Rahway, New Jersey, if there is a good, bright engineer employed in the plant, that man can be educated to keep a pretty close record of all the operations and perform very intelligent work. In larger plants the speaker feels that it is desirable to put a college trained man in charge and have the plant operated under his instruction, while at the same time daily report cards or records are sent to the main office and there checked over and tabulated at frequent intervals for more close inspection.

MR. GEORGE R. TAYLOR: The Board of Health of the State of Pennsylvania has overhauled a number of small plants, less than 1,000,000 gallons daily consumption, and in each case has ordered the owners of such plants to send weekly samples to some chemist in some larger town, who is approved by the State Board of Health, and copies of whose analyses must be sent to the State Board of Health for their approval; and if the results are not satisfactory to them, the owner of the plant is so advised. This refers to bacteriological determinations.

MR. J. M. DIVEN: In the method spoken of by Mr. Taylor the samples of water sent away for analysis are not taken by the chemist making the analysis and can hardly be considered reliable. Most chemists decline to assume any responsibility for water analyses unless they personally take the sample. A much better method would be to have the state or other experts visit the plants occasionally and take samples for analysis, thus checking up the work of the operator.

PROF. J. M. CAIRD: Taking samples once a week is a very risky proposition, as many things may happen in a filter plant in a few hours; therefore a filter plant should be under some technical supervision all the time, and samples should be taken at least for color and turbidity by the operator. If chemicals are going to be used, the water should be tested for the coagulant, to see whether it is working properly and none of it getting into the filtered water.

MR. F. A. DALLYN: In Ontario the Public Health Department has absolute control.

The speaker believes that sending promiscuous samples is an absolutely nonsensical method. The sanitary situation is the real thing that must be examined into, that is, as to whether infection is probable or improbable. In case hypochlorite or other disinfecting agent is being used to protect a doubtful situation, if samples are examined twenty-four hours after being taken, such examination does not really tell you very much, especially if the sample appears to be a good one; it will tell you something if it is bad. The speaker last summer had occasion to check up the administration of hypochlorite at Windsor, where they occasionally have 17 cases of typhoid occurring in one month, and then probably none for a couple of months. A field laboratory was installed to test the effectiveness of the hypochlorite administration. Instead of taking one sample per day, which by some is considered good practice, samples were taken every ten minutes throughout the day. The water was found to be practically sterile up to about three o'clock when, starting with 50 bacteria per cc., it went down to 5, and then went back in another twenty minutes. That occurred on two days. The bacteriologist inquired at the pump house "What are you doing at that time of the day?" The superintendent at the pump house replied "That is the time of the day when they clean out the bleach tanks, wash them out and start them over again." During the twenty minutes when they were not applying bleach they had very bad water. If a single sample were being taken, the analyst would not probably strike that particular time of day once in possibly a hundred times. In Ontario, municipalities can get information from the Provincial Board of Health Bureau who will, upon request, examine into the sanitary situation surrounding a plant and who will discover by analysis the bacteria there are in the water. They can also tell the normal efficiency that the plant ought to show, and probably suggest what improvements, if any, should be made in the administration of purification agents. This is incomparably more valuable to the superintendent than any opinion based on a few analyses made by an engineer who really does not know anything about the situation other than the analyses. The speaker has in mind a case where some analyses were checked which had been made in a municipal laboratory by a man who did not know how to make media. He was making media which would not permit of bacterial growths, which of course showed the water good, even when it was bad. Such cases will occur where people are trying to do something which they know really very little about.

Mr. Francis Ward Langstroth: The speaker does not wish it to be understood that at Rahway they depend entirely upon the bacteriological tests made by the engineer. He is furnished with media, and as he makes the same examinations daily must naturally become familiar with the work, in addition he sends a report card daily to the chemist in New York City who has the supervision of our work. The sample of water that we send weekly to New York reaches our chemist within two hours from the time the sample is taken.

Mr. Sheppard T. Powell: There are a great many plants that cannot afford any kind of a chemist, because they are too small; yet some of these plants, it would seem, should have some kind of scientific supervision, and the only way to do this is to train the engineers who are in charge of the plants. This can be done with small plants by employing a supervising chemist or sanitary engineer who will occasionally go over the work done at the plants and check up the operator who is in charge.

Prof. J. M. Caird: The proposition of sending samples away weekly, or something like that, having the water works superintendent take those samples and send them away, is a very risky procedure. Most of the water works superintendents are getting pretty wise, and if they think they are going to be called upon to send a sample away, they are looking for a good report.

Mr. Francis Ward Langstroth: In order to avoid suspicion in regard to any of the bacteriological tests made at our works, we have at times sent to our chemist in New York City (unknown to our employes) several samples of water for him to examine and compare the results with the daily report sent from our works, and they have always compared favorably. Any water plant that suspects anything wrong should have such tests made.

Mr. W. H. Randall: In regard to trained men being affected by political changes of administration, it very rarely interferes with any trained men in Canada. As to the question of sewage and purification of same, the gentleman from Ontario is aware that we have taken every precaution in Toronto, and have employed experienced or trained men in every case. We find it necessary in a city like Toronto to take every possible precaution, and we try to benefit by others' experience and this week our city council is taking a trip through the United States in order to visit plants where there are sewage systems and disposal plants, to satisfy themselves and to gain experience in connection with that matter.

Mr. Alexander C. Potter (*by letter*): Dr. McLaughlin's point is well taken when he refers to the need of adjusting the balance between water purification and sewage treatment. The writer calls attention to a city in Pennsylvania where a sewer outlet discharges untreated the sewage of about 4000 people, less than half a mile above the water works intake.

The doctor characterizes an incompetent filter operator as an assassin. Is such a man any more so than city officials who, year after year, tolerate conditions such as outlined above to exist?

Is it false security to rely upon the faithfulness of the men in charge of the purification plant? It puts too great a responsibility upon them, faithful as they may be. It is true that, since the installation of the purification plant five years ago, there has been a greater reduction in the death rate than in any other city in the country to my knowledge. The potential danger is still there, and the writer has urged its removal without success.

Dr. McLaughlin's allusion to some views on sewage purification is also timely. The sooner we get away from thinking that sewage must be brought to a drinking water standard, the sooner we can hope for a rational solution of the sewage disposal problem and its more general adoption. In the long run, we can no more frighten people or cities into the adoption of sewage disposal than we can frighten them into religion. The advocacy of a rational view on the matter will bring surer and quicker results.